

## Chapter 2.3 COST/BENEFIT ANALYSIS

### Construction Grants.

The Federal construction grants program was initiated in 1958 to provide financial assistance to municipalities for the planning, design, and construction of publicly owned treatment works. Since then, the program has been an essential element in pollution control efforts, without which many localities would have been unable to provide wastewater treatment systems.

Through 1988, Virginia received approximately \$1.2 billion in federal appropriations for construction grants. These federal funds financed up to 75% of the total eligible cost of approximately 183 projects. The state contributed another \$52.3 million toward project costs, with the remainder coming from local sources. Total local investment in these projects is estimated at \$500 million.

### Virginia Revolving Loan Fund.

In 1988, the conversion from a grant program to a low-interest loan program to provide financial assistance for the planning, design and construction of POTW's began. The 1986 General Assembly created the Virginia Water Facilities Loan Fund, through which loans could be made to local governments at or below current market interest rates for wastewater treatment improvements. Principal and interest repaid into the fund could then be reloaned again for additional projects. The Federal Water Quality Act of 1987 established a State Revolving Loan Fund Capitalization Grant Program which provided an avenue for states to convert federal grant monies into a State Revolving Loan Fund.

On June 10, 1988, Virginia became the first state in EPA Region III and the fifth state in the nation to receive authorization to administer a State Revolving Loan Program. Since then, Virginia has received federal capitalization grants in each fiscal year (FY's 88 through 99) totaling \$414,042,446. In addition, Virginia has provided \$82,808,491 to the program.

Federal law allows grant funds recovered through audit and grant closeouts to be reallocated and converted to loan monies. Virginia has been aggressive in pursuing administrative closeout of the old EPA grant projects, and since 1987, has recovered more than \$30 million through this process.

Table 5.3 - 1 summarizes Revolving Loan Fund status as of June 30, 1999.

Table 5.3 - 1 - Summary of Revolving Loan Fund Status

STATUS	NUMBER	AMOUNT
Loans Closed	142	\$ 587,311,316.67
Loans Committed	31	\$ 80,763,577.00
Targeted For FY 2000	20	\$ 118,548,344.00
Total	193	\$ 786,623,237.67

The impact of Virginia's loan program on water quality and public health can be summarized as follows:

- Eliminated 12 primary dischargers
- Upgraded or replaced 29 inadequate lagoons
- Upgraded, expanded, or replaced 94 outdated treatment facilities
- Improved water quality at 46 locations by significantly reducing infiltration and inflow
- Addressed 28 potential health hazard situations through the elimination of failing septic systems, pit privies, and straight-line discharges
- Eliminated 109 raw sewage overflow points
- Installed nutrient removal technology at 4 treatment facilities discharging to the Chesapeake Bay

The following is a description of the environmental benefits of the projects, which were funded in FY 99.

#### City of Lynchburg (C515193-01)

This project is part of the greater Lynchburg CSO Elimination Program and includes replacement of portions of the Fishing Creek and Ivy Creek Interceptors which are both subject to infiltration and exfiltration and which, during wet weather, overflow due to the upstream combined sewer system. The new interceptors will carry more flow and, with the completion of individual neighborhood CSO projects, will eliminate wet-weather overflows.

#### City of Virginia Beach (C-515205-01)

This project is part of a two-phased funding commitment totaling \$16.2 million to the City to eliminate a documented health hazard due to failing on-site septic systems in the Sandbridge community. The vacuum collection and pumping facilities for this service area should eliminate bacterial contamination and nutrient enrichment in the groundwater community canals, which lead to the Back Bay estuary.

#### Town of Orange (C-515196-01)

Improvements at the water (wastewater component) and wastewater plants helped the Town meet discharge limitations for total suspended solids and total chlorine residual. The new decant basins, sludge pump station and associated force main decreased the discharge of total suspended solids from a maximum of 66 mg/l to approximately 3 mg/l. The de-chlorination system has helped decrease total chlorine residual to nondetectable levels. The alum sludge transferred to the wastewater plant helped with the settlement of primary sludge and the new de-watering centrifuge has supplemented existing drying beds.

#### Russell County (C-515147-01)

Most of the homes in the community of Dante were built in the early 1900's by Clinchfield Coal Company and sold to individuals in the 40's and 50's. Some of the residents relied on private sanitary systems including a few septic systems or outdoor privies. However, the predominate wastewater disposal method (some 74.4% of the 349 inhabited houses in the community) was "straight-pipe" discharge to Lick Creek, a tributary to the Clinch River. Today, the community is served by a modern WWTP and collection system and based on a 1999 technical inspection by DEQ staff, there are now 342 connections to the system.

#### Henry County PSA (C-515197-01)

This project consists of a new gravity collection sewer to serve the Rangeley area of Henry County. Currently, some of the community is served by individual systems, which are malfunctioning. The remainder discharge raw sewage directly to Rangeley Creek. A pump station and force main to connect the gravity sewer system to the Upper Smith River WWTP is also included in the project. Connection to the new system is mandatory and all discharges to Rangeley Creek should be eliminated.

#### Town of Christiansburg (C-515220-01)

August 2000

The project consists of an upgrade and expansion of the existing Christiansburg WWTP. The existing facility is overloaded due to inflow into the Town's sewer system. The project will ensure adequate treatment during wet and dry weather and make process improvements to ensure compliance with new, more stringent discharge requirements.

City of Franklin (C-515180-01)

Chronic by-passing of raw sewage to the Blackwater River during storm events had resulted in enforcement action. Loan funding provided for a detailed sewer system evaluation to identify sources of inflow to the collection system. Collection system improvements included cleaning and grout work, sliplining, open-cut replacement, and elimination of storm sewer cross connection and STP upgrades (UV disinfection and mechanical bar screen).

Town of Blackstone (C-515142-02)

As a result of new effluent limitations for CBOD and ammonia, the Town entered into an enforcement order to upgrade the level of treatment at its existing trickling filter WWTP. The new WWTP (primarily the nitrification tower) will reduce the discharge of pollutants from the current secondary limits to advanced secondary limits for CBOD5 and NH3-N as required by the VPDES permit. The concentration of the discharge for these two pollutants should be reduced to 50-66% of the current discharge and ammonia toxicity should be eliminated.

Bath County (C-515162-02)

The County was under a Consent Decree for failure to meet secondary effluent limitations. This project eliminates an antiquated advanced primary STP dry ditch discharge to a water quality and effluent quality limited stream segment and transports the wastewater to the Hot Springs Regional STP. The project also provides a new collection system, which reduces infiltration/inflow and provides sewerage collection in an area with septic drainfields and privies adjacent to the stream.

Alexandria Sanitation Authority (C-515201-02)

This wastewater treatment plant is being upgraded to meet permit effluent limitations of the Potomac Embayments Policy. The parameters covered by this policy include CBOD, total suspended solids, total phosphorus and ammonia. Also included with this upgrade is the addition of a biological nitrogen removal (BNR) process, which will reduce nitrogen loadings to the Chesapeake Bay. The new activated sludge process will replace the rotating biological contactors, which were limited in meeting new permit limits and nutrient removal goals.

Frederick-Winchester S.A. (C-515209-02)

This Chesapeake Bay watershed project consists of an expansion and upgrade to the Opequon Water Reclamation Facility and will result in improvements to the biological treatment capability of the existing facility and addition of biological nutrient removal.

Loudoun County/Hamilton (C-515185-02)

This project extends sewer lines to address areas of the Town where failing sewage disposal systems and potential health hazards exist. In addition, the project extends sewer service to several drinking water wells so that filter backwash can be discharged to the sewage system. The Town was under a Consent Order to eliminate these discharges. The second component of the project provides a new aerobic sludge digester and additional drying beds at the Town's sewage treatment plant. Rehabilitation of the collection system to eliminate wet-weather overflows and discharges of solids to the stream is also included.

Virginia Recreational Facilities Authority (C-515228-02)

This project consists of installation of new wastewater systems for Explore Park facilities that have been operating on pump and haul systems since there were no areas for conventional septic tank/drainfields nor any other system close enough to serve the Park. Two new systems serving different structures are being installed within the Park, each consisting of SBR systems for pretreatment before final wastewater disposal through innovative drip irrigation systems. There will be no discharge to any streams and minimal

disturbance to the natural area of the Park.

City of Newport News (C-515212-02)

This is the seventh year of funding to Newport News. Efforts have resulted in the improvement of pump station reliability and the elimination of infiltration/inflow throughout the City's collection systems. This project includes the replacement or renovation of five service area collection systems, the renovation of three major pump stations and the mapping/diagnosis of a major service area.

Augusta County S.D. (C515210-02)

Raw sewage overflows from pump stations and high STP flows, due to capacity and infiltration/inflow issues, had resulted in enforcement action by DEQ. The project consists of improvements to eliminate raw sewage overflows through the replacement of three existing pump stations with one adequately sized station. Reduction of some system I/I through the replacement of one of the main interceptors to the STP is also included in the project.

Powhatan County (C-515208-02)

The County operated two antiquated trickling filter plants for the school system which were incapable of consistently meeting secondary limits for BOD and TSS or of meeting new permit limits for TKN. As a result, the County entered into an enforcement order to construct a new regional WWTP. The new WWTP will reduce the discharge of pollutants from the current secondary limits to the required advanced secondary limits for CBOD5, which should result in a greater than 50% reduction in pollutants. In addition, the new WWTP will also reduce TKN and total phosphorus concentrations (which are currently not removed) to advanced-secondary limits, as required by the permit.

City of Lynchburg (C-515184-02)

This was an increase to a project begun in a previous year which includes upgrade of the existing Lynchburg WWTP. The existing facilities are more than 25 years old and have become extremely inefficient. The new facilities will improve treatment through replacement of the aeration system and installation of a new sludge stabilization system employing high pH adjustment utilizing lime.

Loudoun County On-Site (C520-004)

This County-wide program includes the survey of existing communities not currently served by public sewer, which experience high levels of septic failure. The surveys have identified potential health concerns and sources of surface pollutants and nutrients flowing into the Potomac River, a tributary to the Chesapeake Bay. Alternative methods of sewage disposal can then be suggested and financed by low-cost loans to the homeowners. Typically repairs are accomplished through septic tank-soil absorption systems, sand filters, mound systems or small clusters.

The 1996 General Assembly amended the Code of Virginia to provide that financial assistance from the fund could be made available to localities to address malfunctioning or inadequate on-site wastewater disposal systems where public health or water quality concerns exist and where connection to a public sewer system is not feasible. DEQ, VRA and the Department of Health worked together jointly to develop implementation guidelines for a pilot program to make low-interest loans available to local governments which, in turn, lend the money to individual property owners or small businesses to repair or install septic systems, sand filters, mound systems or other innovative, alternative sewage treatment systems.

Virginia's "On-Site" program officially got underway with the first project closing in October 1997. Since then, four additional on-site loans have closed. The program is operating in a "pilot" status during its first several years and some needed changes in the statute's language have been identified.

Also in FY 97, Congress appropriated \$50 million for the Rural Communities Hardship Grant Program. Virginia's share of the appropriation was \$1,376,300 to be used in conjunction with the loan program as hardship grants for rural communities.

August 2000

The 1999 General Assembly approved a bill to allow the State Water Control Board to loan money from the Fund for the construction of facilities or structures to implement agricultural best management practices to prevent pollution of state waters. DEQ is currently developing guidelines for the program and hopes to have it underway in the spring of 2000. benefits of the projects which were funded in FY 99.

### **Nonpoint Source Expenditures**

Building on previous expenditures for nonpoint source related activities totaling approximately \$54.77 million, there has been a substantial increase in funding for nonpoint source pollution control activities over the last two fiscal years. Over \$5.5 million in Chesapeake Bay Implementation Grant funding was made available for nonpoint source pollution control efforts during the last two fiscal years. In FY 1998, funding through Section 319 of the Clean Water Act totaled approximately \$1.96 million. In FY 1999, Section 319 funding increased to approximately \$3.55 million.

In addition, substantial state funding has been made available for nonpoint source pollution management programs. Virginia Water Quality Improvement Act funding for nonpoint source pollution management program activities totaled approximately \$16.5 million for the FY 1999 - 2000 biennium. These funding increases have resulted in unprecedented levels of implementation.

### **604(b), 104(b)(3), and Clean Lakes Grant Programs**

These Federal funds have historically been used for Water Quality Management Planning and Implementation projects. The financial resources have been split between the Planning District Commissions for watershed planning and educational activities, and internal Special Projects for equipment acquisitions (to facilitate water quality monitoring and assessment activities) and for special studies.

During this assessment cycle, under direction from EPA, emphasis has been placed on projects that lead to, or support, TMDL development. Approximately \$232,000 was committed to TMDL activity through utilization of Federal Grant Funds. The following projects have been funded during this assessment cycle supporting TMDL activities:

Minimum Instream Flow Project: Shenandoah River  
 Hardware and software acquisition for TMDL activities  
 Muddy Creek Nitrate Study, Rockingham County  
 Non-Point Pollution Study, DEQ West Central Regional Office  
 Pamunkey River Model  
 Winterpock Creek & Upham Creek-data collection  
 Trout Farm Solids Reduction Study  
 Supplemental Stream Gauging and gauging equipment

Table 2.3 - 2 are summaries of 604(b), 104(b)(3), and Clean Lakes grant expenditures for the period June 1992 through September of 1998.

Table 2.3 - 2 Summary of Water Quality Management Grants

YEAR	604(B)	104(B)(3)	CLEAN LAKES	YR TOTAL
1992-1993	\$401,657	NA	\$104,491	\$506,148
1993-1994	\$397,328	NA	NA	\$397,328

<b>YEAR</b>	<b>604(B)</b>	<b>104(B)(3)</b>	<b>CLEAN LAKES</b>	<b>YR TOTAL</b>
1994-1995	\$246,537	\$149,040	\$56,250	\$451,827
1995-1996	\$254,620	\$182,160	\$28,000	\$464,780
1996-1997	\$417,075	\$161,807	-0-	\$578,882
1997-1998	\$221,655	\$189,760	-0-	\$411,325
<b>TOTALS</b>	<b>\$1,938,872</b>	<b>\$682,767</b>	<b>\$188,741</b>	<b>\$2,810,380</b>